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What They Do

Sheet Metal Workers perform all operations necessary to make, install, and repair a wide variety of products made from metal sheets. They also may work with fiberglass and plastic materials. Sheet Metal Workers first study plans, blueprints, and specifications to determine the kind and quantity of materials they will need. They locate and mark reference points, and using shop mathematics, calculate angles and curves. Next, they cut the flat material and shape it into a three-dimensional form, using hand and power-driven tools and fabricating machines. In an increasing number of shops, Sheet Metal Workers use computerized metal-working equipment. This enables them to experiment with different layouts to find the one that results in the least waste of material. They cut, drill, and form parts with computer-controlled saws, lasers, shears, and presses.

Most Sheet Metal Workers work for contractors who specialize in sheet-metal equipment for residential, industrial, or commercial buildings. They install heating, ventilating and air conditioning systems, as well as roofing, siding and drains. Many sheet metal parts come in standard sizes and shapes, quickly assembled at the job site and need little change for a proper fit. Residential sheet metal parts are inexpensive and easy to mass produce. As a result, residential Sheet Metal Workers may do only on-site installation, often using flexible duct instead of more expensive, custom parts.

Tasks

- ▶ Determine project requirements, including scope, assembly sequences, and required methods and materials, according to blueprints, drawings, and written or verbal instructions.
- ▶ Select gauges and types of sheet metal or non-metallic material, according to product specifications.
- ▶ Lay out, measure, and mark dimensions and reference lines on material, such as roofing panels, according to drawings or templates, using calculators, scribes, dividers, squares, and rulers.
- ▶ Drill and punch holes in metal, for screws, bolts, and rivets.
- ▶ Fasten seams and joints together with welds, bolts, cement, rivets, solder, caulks, metal drive clips, and bonds in order to assemble components into products or to repair sheet metal items.
- ▶ Finish parts, using hacksaws, and hand, rotary, or squaring shears.
- ▶ Inspect individual parts, assemblies, and installations for conformance to specifications and building codes, using measuring instruments such as calipers, scales and micrometers.

Sheet Metal Workers

- ▶ Shape metal material over anvils, blocks, or other forms, using hand tools.
- ▶ Trim, file, grind, deburr, buff, and smooth surfaces, seams, and joints of assembled parts, using hand tools and portable power tools.
- ▶ Install assemblies, such as flashing, pipes, tubes, heating and air conditioning ducts, furnace casings, rain gutters, and down spouts, in supportive frameworks.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- ▶ Installation — Installing equipment, machines, wiring, or programs to meet specifications.
- ▶ Operation and Control — Controlling operations of equipment or systems.
- ▶ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ▶ Mathematics — Using mathematics to solve problems.
- ▶ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ▶ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ▶ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ▶ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ▶ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- ▶ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ▶ Static Strength — The ability to exert maximum muscle force to lift, push, pull, or carry objects.
- ▶ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ▶ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

Work Environment

Sheet Metal Workers may work inside or outside, in a shop or at the job site. Most shops have adequate lighting, ventilation, and machinery safeguards, but may be unheated, oily, greasy, and noisy. At job sites, work may be done from high ladders and scaffolding, or in confined areas. Those who install siding, roofs, and gutters are exposed to all kinds of weather. Sheet Metal Workers are subject to cuts from sharp metal, burns from soldering and welding, falls from ladders and scaffolds, and harmful noise levels. They usually wear safety glasses but must avoid wearing jewelry or loose-fitted clothing that could easily be caught in machinery. They stand for long periods and lift heavy materials and finished pieces. Those performing installation work do considerable bending, lifting, standing, climbing, and squatting, sometimes in close quarters.

Sheet Metal Workers

Sheet Metal Workers usually work a 40-hour week. Many belong to the Sheet Metal Workers International Association.

What's the California Job Outlook?

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2004	Estimated Number of Workers 2014	Average Annual Openings	2006 Wage Range (per hour)
Sheet Metal Workers				
47-2211	20,000	24,200	900	\$14.97 to \$28.15

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Job opportunities are expected to grow faster than average compared with all occupations in California. The largest contributors to this growth are the increased demand for new housing in California and the demand for more energy efficient air-conditioning, heating, and ventilation systems in older structures. Since equipment maintenance makes up a large part of the work done by Sheet Metal Workers, the demand for workers in this occupation is less sensitive to the declines in new construction than employment of some other construction trades.

It is important for Sheet Metal Workers to keep up-to-date with technological changes because sheet metal shops are increasingly using new technological developments such as computerized layout and laser-cutting machines.

Training/Requirements/Apprenticeships

Sheet Metal Workers usually follow one of the following training paths:

- ▶ Formal, four-year apprenticeship
- ▶ Community college programs or certificates
- ▶ Vocational school
- ▶ Extensive on-the-job training

Completion of a four-year apprenticeship is the general requirement to becoming a Sheet Metal Worker. Apprenticeship programs, administered in each area by the local Sheet Metal Joint Apprenticeship Committee, consist of four or five years of on-the-job training and an average of 200 hours per year of classroom instruction. Apprenticeship programs provide comprehensive instruction in both sheet metal fabrication and installation.

Many community colleges offer manufacturing technology and machine shop certificates or degrees. For further information, go to the *Career Center* page at www.labormarketinfo.edd.ca.gov.

Recommended High School Course Work

High School preparation courses in metal shop, algebra, geometry, trigonometry, mechanical drawing, blueprint reading, drafting, physics, and computer programming are helpful.

Sheet Metal Workers

Where Do I Find the Job?

Direct application to employers remains one of the most effective job search methods. Candidates for training or apprenticeship programs should apply directly to employers who employ Sheet Metal Workers. Community colleges offer assistance in finding jobs to graduates of degree or certificate programs in sheet metal occupations or machine shops. Unions representing Sheet Metal Workers also have information concerning apprenticeships and related matters.

Use the *Search for Employers by Industry* feature on the *Career Center* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. Search using keywords from the following manufacturing industry names to get a list of private firms and their addresses:

- ▶ Aircraft Engine and Engine Parts
- ▶ Aircraft Manufacturing
- ▶ Fabricated Structural Metal Mfg
- ▶ Guided Missiles and Space Vehicles
- ▶ Metal Window and Door Manufacturing
- ▶ Ornamental and Architectural Metal Work
- ▶ Other Aircraft Parts and Equipment
- ▶ Plate Work Manufacturing
- ▶ Prefabricated Metal Building and Component
- ▶ Sheet Metal Work Manufacturing

Search these **yellow page** headings for listings of Contractors and private firms:

- ▶ Air Conditioning Contractors & Systems
- ▶ Building, General Contractors
- ▶ Heating Contractors
- ▶ Metal Fabricators
- ▶ Metal Specialties
- ▶ Sheet Metal Work
- ▶ Sheet Metal Working Equipment & Supplies

Where Can the Job Lead?

Journey-level Sheet Metal Workers may advance to supervisory jobs, while others may become estimators or managers. Some Sheet Metal Workers may go into the contracting business for themselves. Because a sheet metal contractor must have a shop with equipment to fabricate products, this type of business is more expensive to undertake than other types of construction businesses. Self-employed contractors must obtain a sheet metal contractor's license from the California Contractors State License Board. (Refer to *Other Sources of Information*).

Other Sources of Information

California Department of Consumer Affairs
www.dca.ca.gov

Contractors State License Board
www.cslb.ca.gov

Division of Apprenticeship Standards
www.dir.ca.gov/das

Sheet Metal Workers International Association
www.smwia.org

International Training Institute for the Sheet Metal and Air Conditioning Industry
www.sheetmetal-iti.org